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Deploying Microsoft Exchange 2010 on Hitachi Compute Rack 220 and Hitachi Unified Storage 130

Implementation Guide

By Leo Nguyen

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Hitachi Data Systems

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Deploying Microsoft Exchange 2010 on Hitachi Compute Rack 220 and Hitachi Unified Storage 130

Implementation Guide

Microsoft Exchange Server 2010 is an email and calendar tool used to increase employee productivity. Planning and deploying an Exchange enterprise environment is a complex task requiring many hours of work.

Use this document to plan your installation, configuration, and deployment of an Exchange 2010 two-node DAG deployment for 2,000 mailboxes running on two Hitachi Compute Rack 220 servers and one Hitachi Unified Storage 130.

On the storage level, Hitachi Dynamic Provisioning distributes the host workload across many RAID groups. This provides a smoothing effect that dramatically reduces hot spots.

On the host level, Hitachi Dynamic Link Manager provides comprehensive load balancing with path failover and failback capability. This is for higher data availability, reliability, and accessibility.

This implementation guide is intended for you if you are an administrator deploying Microsoft Exchange 2010. You need some familiarity with the following to benefit from this document:

- Hitachi Unified Storage 100 family
- Hitachi Storage Navigator Modular 2
- Microsoft Windows Server 2008 R2
- Microsoft Exchange Server 2010

Solution Components

The following are the components used in this solution:

- **Hitachi Compute Rack 220 (CR 220)**—2U rack mountable server
- **Hitachi Unified Storage 130**—High performance and scalable storage system
- **Brocade 5340 Fibre Channel Switch**—SAN connectivity to the storage network
- **Microsoft Windows Server 2008 R2**—Multi-purpose server software designed to increase the reliability and flexibility of your infrastructure
- **Microsoft Exchange Server 2010**—Enterprise email application with database high availability and site resiliency through database availability groups

Figure 1 illustrates the Exchange environment using Hitachi Compute Rack 200 servers and Brocade switches.

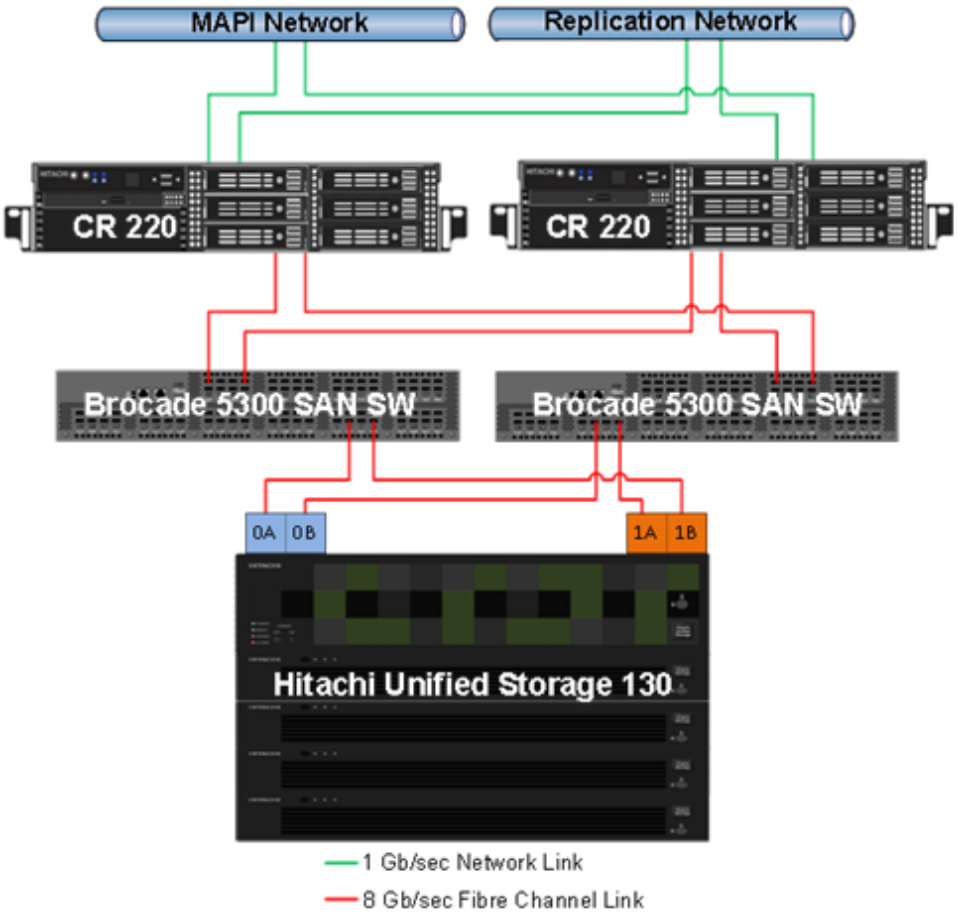

Figure 1

Hardware Components

Table 1 describes the hardware used for this solution.

Table 1. Hardware Components

Hardware	*Detail Description*	*Version*	*Quantity*
Hitachi Unified Storage 130	■ Active/Active Controllers ■ 16 × 8 Gb/sec Fibre Channel ports ■ 32 GB cache memory ■ 36 × 2 TB 7.2k RPM SAS disks	0915/B-S	1
Hitachi Compute Rack 220	■ 2 × Quad-core Intel Xeon 2.4 GHz E5620 ■ 24 GB RAM ■ 1 × Emulex dual port 8 Gb/sec HBA ■ 2 × 1 Gb/sec onboard NIC ■ 2 × Power supply modules	7TTSHE-F9	2
Brocade 5300	■ 8 Gb/sec Fibre Channel switch	FOS v6.4.2B	2

Software Components

Table 2 describes the software used for this solution.

Table 2. Software Components

Software	*Version*
Hitachi Storage Navigator Modular 2	21.50
Hitachi Dynamic Link Manager	7.2
Hitachi Dynamic Provisioning	Microcode Dependent
Microsoft Windows Server	2008 R2 Enterprise Edition SP1
Microsoft Exchange Server	2010 Enterprise Edition SP2

Solution Implementation

Deploying this solution requires the following steps.

1. Configure Hitachi Compute Rack 220
2. Configure Storage Area Network (SAN))
3. Configure Hitachi Unified Storage 130
4. Install Software
5. Configure Microsoft Exchange 2010

Your implementation checklist may vary, based on your environment and your requirements.

Configure Hitachi Compute Rack 220

Hitachi Compute Rack 220 is a dual-socket Intel Xeon processor-based, 2U midrange rack mountable server platform. It provides advanced systems management and redundancy options, such as the following:

- Dual 1 Gb/sec network adapters
- 1 management port
- 5 PCIe expansion slots
- 12 memory slots
- RAID level configuration, up to six 3.5 inch internal drives
- Dual power supplies
- Remote management (IP-based KVM/web console)

Perform this configuration on the Hitachi Compute Rack 220 server platform before configuring the other hardware.

Configure Remote Management

The Hitachi Compute Rack is equipped with a baseboard management controller (BMC) mounted on the motherboard. Use this to access devices remotely, such as the keyboard, mouse, virtual floppy disk, and virtual CD/DVD. This remote device function allows the following:

- Operation of the BIOS and operating system of the system unit
- Installation of utilities from the virtual CD/DVD

These are the steps to connect and configure the remote management for the compute rack. Figure 2 shows the location of the management port used to configure the remote management. Table 3 has the factory defaults for Hitachi Compute Rack 220.

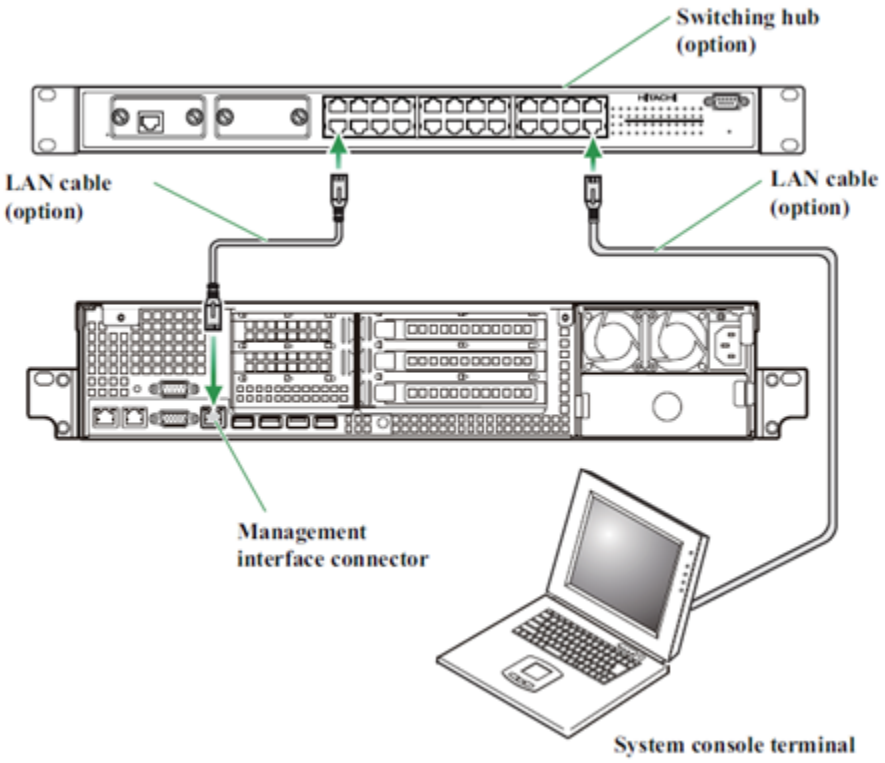

Figure 2

Table 3. Hitachi Compute Blade 220 Default Factory Setting

Item	*Factory Defaults*
IP address	192.168.100.100
Subnet mask	255.255.255.0
Default gateway	Not set
HTTP	Enabled
User Name	user01
Password	pass01

To configure one of the Hitachi Compute Rack 220 servers, do the following:

1. Physically connect to the same switch hub.

   (1) From a **management port** on the Hitachi Compute Rack, connect a network cable to a switch hub.

   (2) From a laptop computer, connect a network cable to the switch hub.

2. On the laptop, configure a static IP of **192.168.100.101**.
3. Verify connectivity.
   - Ping the management port **192.168.100.100** and then wait for a reply.
     - If there is no reply, check your connections to the switch hub.
4. On the laptop, install the **remote console software**.
   - The software is included with the hardware.

   This software remotely manages Hitachi Compute Rack 220 virtual devices.
5. Launch the **remote console hardware**.

   (1) On the desktop of the laptop, click R**emote Console**.

   (2) In **IP address**, type `192.168.100.100`.
6. Log on using the default user name and password in Table 3. Hitachi Compute Blade 220 Default Factory Settings.

Repeat these procedures on the other Hitachi Compute Rack 220.

After a successful connection, the console displays (Figure 3).

- If not, press Alt+G to display the console.

Figure 3

Access Web Console

Use the web console to do the following:

- View server and log information
- Configure networking settings
- Update BMC firmware.

To use the web console, do the following:

1. Open a web browser and type the following into the address bar:

   `http://192.168.100.100/cgi-bin/login.cgi`
2. Log on using the default user name and password (Table 3. Hitachi Compute Blade 220 Default Factory Settings).

Figure 4 shows the detailed information after a successfully log on.

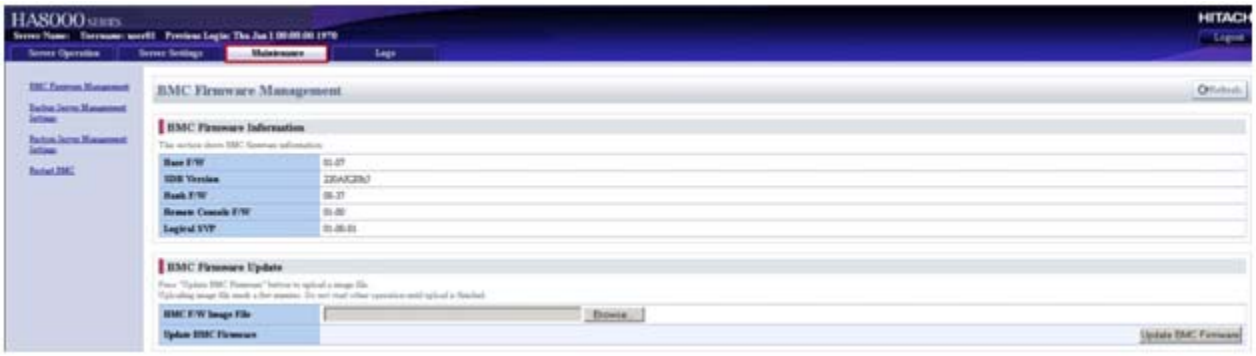

Figure 4

Configure the HBA and Server BIOS

This is how to configure the HBA BIOS and compute BIOS on the Hitachi Compute Rack 220 server. This is required for the SAN OS boot process to work successfully. Do this process after racking both servers and completing all cabling.

To configure the BIOS on a Hitachi Compute Rack 220 server, do the following:

1. Flash the server firmware.

   - Use the **x86 BootBIOS** boot code. Get this firmware code from the **Support** section of the Emulex website.
   - For instruction on how to flash the firmware see boot code user manual from http://www.emulex.com/downloads.

   Before a Hitachi Compute Rack 220 server can detect an Emulex HBA, you must flash the firmware.

2. Install the HBA.

   (1) Verify that the power for the server is off.

   (2) Install one dual-port HBA into one of the PCIe slots on the back of the server.

3. Configure the HBA BIOS.

   (1) Start the HBA BIOS configuration.

   i. Power the server on.

   ii. During boot up, press Ctrl+E to configure the HBA BIOS.

   iii. On the main menu, choose **Enable Boot from SAN**.

   iv. Press Esc to return to the main menu.

(2) Choose the topology.

i. On the main menu, choose **Topology** and then choose **Auto Topology: Point to Point First**.

ii. Press Esc to return to the main menu.

(3) Choose the link speed.

i. On the main menu, choose **Link Speed** and then choose **8 Gigaband**.

ii. Press Esc to return to the main menu.

(4) Choose **Save** to exit the HBA BIOS screen.

4. Configure the Server BIOS.

(1) During boot up, press F2 to configure the server BIOS.

(2) On the **boot** tab, verify that the **DVD-ROM** is set to be the first device for boot priority.

(3) Press **F10** to save and to exit.

5. Choose the primary boot device.

(1) While booting the server, press Ctrl+E to enter into the HBA BIOS.

(2) On the main menu, choose **Boot Device**.

(3) From the list of saved boot devices, choose **1. Unused**.

(4) Choose a boot volume and set the boot LUN to **00** for primary boot.

(5) Press Esc to return to the main screen.

(6) Choose **Save** to exit.

Configure Storage Area Network (SAN)

Configure the storage area network (SAN) after configuring the Hitachi Compute Rack 220 server platform.

Zone SAN Switches

Recommended practice is to configure each port to use a different switch for redundancy. However, your organization's guidelines for zoning might vary. Check with your IT department.

To configure zoning for the SAN switches, do the following:

1. Create aliases for ports.
2. Create zones.
3. Add members (aliases) to the zones.

4. Save the zones.
5. Enable the zones.

Configure two zones for the following:

- SAN OS boot on storage ports 0A and 1A
- Exchange databases and logs on storage ports 0B and 1B

Configure Hitachi Unified Storage 130

Hitachi Unified Storage is a midrange storage platform for all data. It helps businesses meet their service level agreements for availability, performance, and data protection.

The performance of Hitachi Unified Storage is reliable, scalable, and available for block and file data. It is simple to manage, optimized for critical business applications, and more efficient.

Use Hitachi Unified Storage for a lower investment in storage. Deploy this storage, which grows to meet expanding requirements and service level agreements, for critical business applications. Simplify your operations with integrated set-up and management for a quicker time to value.

Hitachi Unified Storage enables extensive cost savings through file and block consolidation to build a cloud infrastructure at your own pace to deliver your services.

Hitachi Unified Storage 130 is a symmetric active/active midrange storage platform. It has a broad interoperability for critical data and application needs through the flexibility of Fibre Channel and iSCSI support.

There is a wide range of disk RAID configurations supported on the Hitachi Unified Storage 130, using SAS, SATA, and SSD drives. It has a capacity of scaling up to 960 total drives using 2U or 4U expansion trays.

Configure the storage using the following processes. You must have all licenses installed on your storage system before doing these processes.

Configure Fibre Channel Port Settings

Before starting this process, verify the following:

- Connection of both HBAs on the server to the Fibre Channel switches
- Zoning of the storage system ports

To configure the Fibre Channel port settings, do the following for Port 0A, Port 1A, Port 0B, and Port 1B.

1. Open Hitachi Storage Navigator Modular 2.

   (1) Open a web browser and type the following in the address bar:

   `http://127.0.0.1:23015/StorageNavigatorModular/Login`

   (2) Log on using these credentials.

   User ID: `system`

   Password: `manager`

2. Open the Fibre Channel port settings.

   (1) Click the **Array Name** link to open the storage system.

   (2) Expand the **Settings** heading and click the **FC Settings** link.

   (3) Click **FC Port <port name>**.

   The Fibre Channel port properties display with an option to edit the Fibre Channel port.

3. Edit the Fibre Channel port settings.

   (1) Click **Edit FC Port**.

   (2) Click **8Gbps** from the **Transfer Rate** menu.

   (3) Click **Point-to-Point** from the **Topology** menu.

   (4) Click **OK**.

   A message displays indicating that the change interrupts I/O between any hosts that are connected to the port at this time.

   (5) Click **Confirm** and wait a few seconds for the change to take place.

After establishing the connection between the storage system and the host, the **FC Settings** window shows all ports with the status **LinkUp(F_Port Connected)**.

Enable Host Group Security

Enabling host group security allows you to create multiple host groups on a single storage port. This allows you to isolate traffic for an HBA.

To enable the host group security ports, do the following.

1. Open Hitachi Storage Navigator Modular 2.

   (1) Open a web browser and type the following in the address bar:

   `http://127.0.0.1:23015/StorageNavigatorModular/Login`

   (2) Log on using these credentials.

   User ID: `system`

   Password: `manager`

2. Open the host group settings.

   (1) Click the **Array Name** link to open the storage system.

   (2) Expand the **Groups** heading and click the **Host Groups** link.

3. Edit the host group security.

   (1) Select ports **0A**, **1A**, **0B**, and **1B**.

   (2) Click **Change Host Group Security**.

   (3) Select the **Yes** check box

   (4) Click **OK**.

Now host security group is enabled on those ports.

Create Dynamic Provisioning Pools

This solution uses RAID-10 (2D+2D) for the dynamic provisioning pool configurations given in Table 4.

Table 4. Dynamic Provisioning Pool Configuration

Dynamic Provisioning Pool	*Number of RAID Groups*	*Number of Drives*	*Usable Pool Capacity (TB)*	*Purpose*
0	1	4	3.5	SAN OS Boot
1	3	12	10.6	Database (active)
2	3	12	10.6	Database (passive)
3	1	4	3.5	Log (active)
4	1	4	3.5	Log (passive)

A dynamic provisioning pool spreads I/O workloads across multiple physical disks to balance workloads, eliminate bottlenecks, and to reduce the costs of managing performance and capacity.

To create each dynamic provisioning pool using the pool configuration information in Table 4, follow these steps, starting with Pool 0.

1. Open Hitachi Storage Navigator Modular 2.

   (1) Open a web browser and type the following in the address bar:

   `http://127.0.0.1:23015/StorageNavigatorModular/Login`

   (2) Log on using these credentials.

   User ID: `system`

   Password: `manager`

2. Open the volumes settings.

   (1) Click the **Array Name** link to open the storage system.

   (2) Expand the **Groups** heading and click the **Volumes** link.

   The right pane has three tabs: **Volumes**, **RAID Groups**, and **DP Pools**.

3. Create a dynamic provisioning pool.

   (1) Click the **DP Pools** tab and then click **Create Pool**.

   The **Create DP Pool** window displays.

   (2) Click the following from each menu, as shown in Figure 5

   - *RAID 1+0* from the **RAID Level** menu
   - *2D+2D* from the **Combination** menu

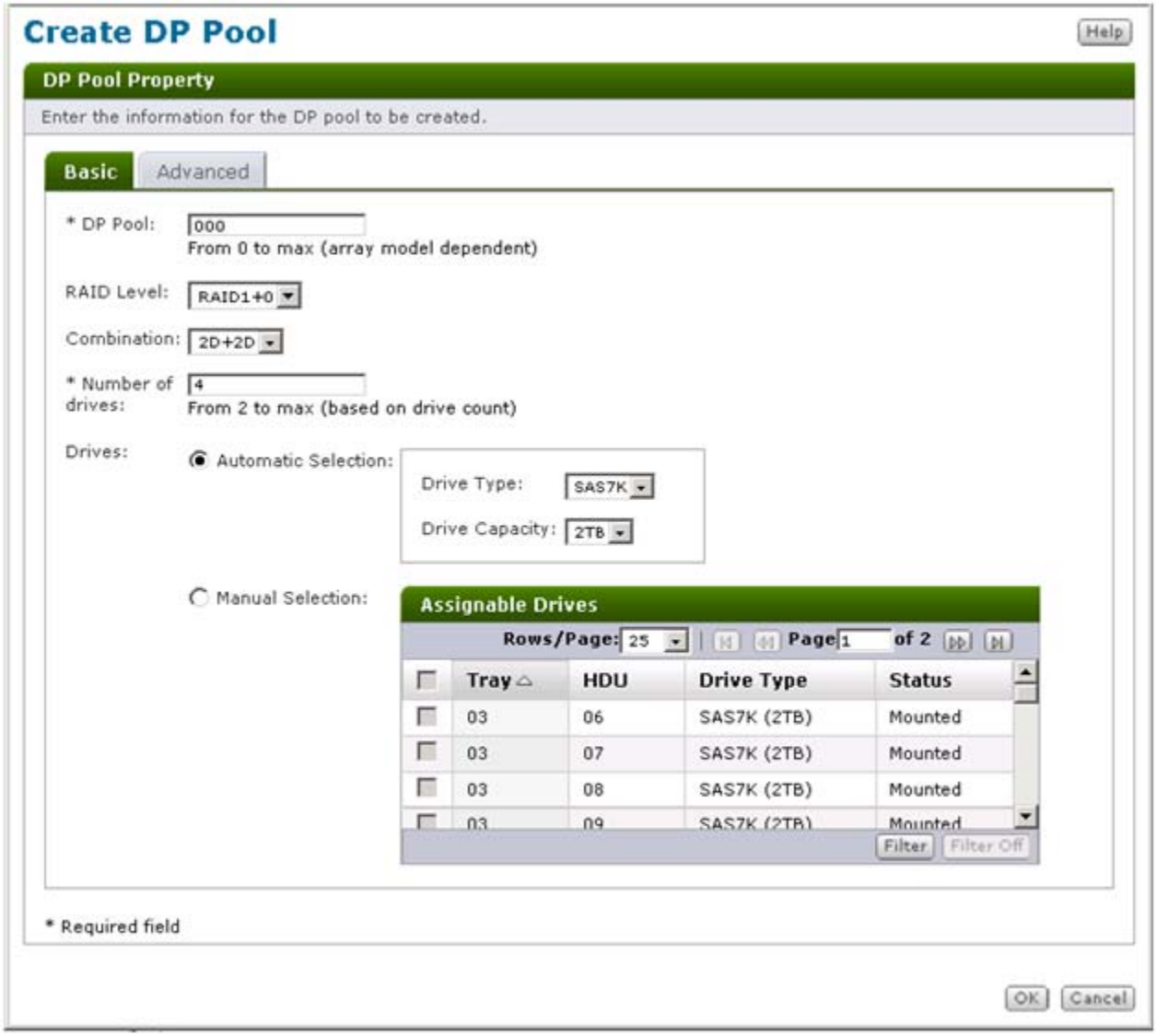

Figure 5

The **Number of drives** changes automatically, based on what you click for the RAID level and combination.

(3) Click an option for **Drives**.

- **Manual Selection**—Click this option if you have different types of drives installed in the storage system. This could be SATA and SAS drives, or drives of different capacities. Then select the correct drive type in the **Assignable Drives** table so that Hitachi Storage Navigator Modular 2 selects the correct type of hard drive.
- **Automatic Selection**—Click this option to have Hitachi Storage Navigator Modular 2 select the next available drives shown in **Assignable Drives** table.

Hitachi Data Systems recommends clicking **Automatic Selection** when all your drives are the same type.

(4) Click the **Advanced** tab, to modify any of the settings based on your environment requirements, and then click **OK**.

A message displays indicating successful creation of the dynamic provisioning pool.

4. Click **Close**.

   The pool immediately starts the formatting process in the background.

5. If necessary, increase the capacity of the dynamic pool using data from Table 4.

   Do this for Pool 1 and Pool 2.

   - Any pool created from more than one RAID group needs to have its capacity increased.

   (1) Click the **DP Pools** tab

   (2) Select the check box for the pool.

   (3) Click **Add Pool Capacity**.

   (4) Click the **Automatic Selection** option.

   (5) Click **OK**.

Use this process to create each dynamic provisioning pool in Table 4.

Create Volumes

Create volumes from the dynamic provisioning pools for presenting to each host in order to store data for these purposes:

- SAN OS boot
- Exchange database
  - DB1
  - DB2
  - DB3
  - DB4
  - DB5
  - DB6
- Log volumes
  - LOG1
  - LOG 2
  - LOG3
  - LOG 4
  - LOG 5
  - LOG6

Table 5 has the volume configuration for this solution.

Table 5. Volume Configuration

Host	DP Pool	Volume	Size (GB)	Purpose
MBX1	0	1	200	SAN OS Boot
	1	21	600	DB1 (active)
	1	22	600	DB2 (active)
	1	23	600	DB3 (active)
	2	24	600	DB4 (passive)
	2	25	600	DB5 (passive)
	2	26	600	DB6 (passive)
	3	27	60	LOG1 (active)
	3	28	60	LOG2 (active)
	3	29	60	LOG3 (active)
	4	30	60	LOG4 (passive)
	4	31	60	LOG5 (passive)
	4	32	60	LOG6 (passive)
MBX2	0	2	200	SAN OS Boot
	1	33	600	DB1 (passive)
	1	34	600	DB2 (passive)
	1	35	600	DB3 (passive)
	2	36	600	DB4 (active)
	2	37	600	DB5 (active)
	2	38	600	DB6 (active)
	3	39	60	LOG1 (passive)
	3	40	60	LOG2 (passive)
	3	41	60	LOG3 (passive)
	4	42	60	LOG4 (active)
	4	43	60	LOG5 (active)
	4	44	60	LOG6 (active)

To create each volume in Table 5, do the following steps, starting with Volume 1:

1. Open Hitachi Storage Navigator Modular 2.

   (1) Open a web browser and type the following in the address bar:

   `http://127.0.0.1:23015/StorageNavigatorModular/Login`

   (2) Log on using these credentials.

   User ID: `system`

   Password: `manager`

2. Open the volumes settings.

   (1) Click the **Array Name** link to open the storage system.

   (2) Expand the **Groups** heading and click the **Volumes** link.

3. Create a volume.

   (1) Click **Create Vol**.

   The **Create Volume** window displays.

   (2) For **Type**, click the **DP Pool** option.

   (3) From the **RAID Group/DP Pool Number** menu, click the pool number from Table 5.

   - For example, for Volume 1, click **000**.

   (4) In **Vol**, type the volume number in Table 5. Volume Configuration.

   - For example, for Volume 1, type `1`.

   (5) For **Capacity**, type the size in the box and then click the unit from the menu.

   - For example, for Volume 1, type `200` in the box and then click **GB** from the menu.

   (6) Leave the **Accelerate Wide Striping Mode** check box clear (unchecked).

   (7) Click **OK**.

The **Create Volume** pane refreshes, populated with the new **Volume** information.

Use this process to create each volume in Table 5. Volume Configuration.

Create Host Groups

Create the host groups after completing the zoning on the SAN switches. Do this to make sure there are multiple paths available to the volumes for high availability and failover.

Table 6 has the host group names as part of the SAN configuration.

Table 6. SAN Configuration with Host Group Names

Host	*Host HBA Name*	*Storage Host Group Name*	*Storage Port*	*Zone Name*
MBX1	HBA1_1	MBX1_OS	0A	MBX1_HBA1_1_0A
	HBA1_2	MBX1_OS	1A	MBX1_HBA1_2_1A
	HBA1_1	MBX1_EX	0B	MBX1_HBA1_1_0B
	HBA1_2	MBX1_EX	1B	MBX1_HBA1_2_1B

Table 6. SAN Configuration with Host Group Names

Host	*Host HBA Name*	*Storage Host Group Name*	*Storage Port*	*Zone Name*
MBX2	HBA1_1	MBX2_OS	0A	MBX2_HBA1_1_0A
	HBA1_2	MBX2_OS	1A	MBX2_HBA1_2_1A
	HBA1_1	MBX2_EX	0B	MBX2_HBA1_1_0B
	HBA1_2	MBX2_EX	1B	MBX2_HBA1_2_1B

To create each host group in Table 6, do the following, starting with Host Group MBX1_OS.

1. Open Hitachi Storage Navigator Modular 2.

   (1) Open a web browser and type the following in the address bar:

   `http://127.0.0.1:23015/StorageNavigatorModular/Login`

   (2) Log on using these credentials.

   User ID: `system`

   Password: `manager`

2. Open the host group settings.

   (1) Click the **Array Name** link to open the storage system.

   (2) Expand the **Groups** heading and click the **Host Groups** link.

3. Create a host group.

   (1) Click **Create Host Group**.

   Leave **Host Group No.** unchanged. Hitachi Storage Navigator Modular 2 automatically uses the next number.

   (2) In **Name**, type the host group name using Table 6.

   This name identifies the connected hosts.

   (3) Select the ports for the host group using Table 6.

   - For example, for Host Group MBX1_OS, use Port **0A** and Port **1A**.

   (4) Select the **World Wide Names** to add to the host group, and then click **Add**.

   - If the storage system does not detect the HBA ports, their WWNs are not in the **Detected WWNs** window. In that case, troubleshoot the environment to verify that the proper settings for the storage ports, host HBAs, and switches.

   The window automatically refreshes and the added WWNs display in the **Selected WWNs** column.

4. Add volumes to the host group.

   (1) Click the **Volumes** tab.

   (2) Select all the volumes to be added.

   (3) Click **Add**.

   The screen automatically refreshes and the added volumes display in the **Assigned Volumes** column.

5. Set the operating system.

   (1) Click the **Options** tab.

   (2) From the **Platform** menu, click **Windows**.

   (3) Click **OK**.

Use this process to create each host group. Use Table 6 for the host group names.

Install Software

Follow these processes to install software for this solution.

Install Microsoft Windows 2008 R2

Do the following to install Microsoft Windows Server 2008 R2.

1. After the HBA detects the LUN in the BIOS, set the boot priority to 0.
2. Place the Windows Server DVD into the DVD-ROM drive.
3. Follow the install wizard to complete the OS installation
   - Use a strong password when creating the local administrator account.
4. Install all Windows Server service packs and patches, so the installation is up to date.
5. Join this server to an Active Directory domain prior to installing Microsoft Exchange.

For more information, see the Microsoft TechNet article “Installing Windows Server 2008 R2.”

Install Hitachi Dynamic Link Manager

Hitachi Dynamic Link Manager provides comprehensive multipathing, robust path failover, load balancing and integrated path management.

To install Hitachi Dynamic Link Manager, follow the instructions in the user guide that accompanies the software.

Install Microsoft Exchange 2010 Enterprise Edition SP2

Install Microsoft Filter Pack 2.0, .NET Framework 3.5 SP1 and IIS components prior to installing Microsoft Exchange.

To install Microsoft Exchange 2010 Enterprise Edition SP2, do the following.

1. Insert the Exchange DVD to launch the install wizard.
2. Click **Install Microsoft Exchange** to begin the installation process.
3. Click **Typical Exchange Server Installation**.
4. Follow the wizard to complete the install.
5. Reboot the server for the changes to take effect.
6. After the reboot, download Exchange SP2 and update the installation.

For more information, see the Microsoft *TechNet* article, "Deploying Exchange 2010."

Configure Microsoft Exchange 2010

This guide documents a Microsoft Exchange 2010 two-node DAG deployment for 2,000 mailboxes with two database copies.

Create a Database Availability Group (DAG)

A database availability group (DAG) is a high availability feature in Microsoft Exchange 2010. DAG supports mailbox database replication and database and server switchovers and failovers.

A DAG supports up to 16 mailbox servers. Any server within a DAG has the ability to host a copy of a mailbox database from any other server within the DAG.

To create a DAG for a mailbox server configuration, do the following.

1. On Exchange Management Console, from the **Action** menu, click **New DAG**

   The wizard automatically creates a **witness server** and **witness directory** to store the DAG information.
2. After creating the DAG, right-click the DAG and then click **Properties**.
3. On the **IP Addresses** tab, assign a static IP to the DAG.
4. On the **General tab**, configure an alternate witness server and witness directory for redundancy.

5. Right-click the DAG, and click **Manage DAG Membership**.
6. Click **Add** and then select **MBX1** and **MBX2**.
7. Click **OK** to confirm.

Table 7 shows the configuration for the active and passive Exchange databases and logs. Use this as a guide with the database copies layout.

Table 7. Exchange Databases and Logs Configuration

Mailbox Server	*Database Name*	*Database Drive Letter*	*Log Name*	*Log Drive Letter*
MBX1	DB1 (active)	E	LOG1 (active)	K
	DB2 (active)	F	LOG2 (active)	L
	DB3 (active)	G	LOG3 (active)	M
	DB4 (passive)	H	LOG4 (passive)	N
	DB5 (passive)	I	LOG5 (passive)	O
	DB6 (passive)	J	LOG6 (passive)	P
MBX2	DB1 (passive)	E	LOG1 (passive)	K
	DB2 (passive)	F	LOG2 (passive)	L
	DB3 (passive)	G	LOG3 (passive)	M
	DB4 (active)	H	LOG4 (active)	N
	DB5 (active)	I	LOG5 (active)	O
	DB6 (active)	J	LOG6 (active)	P

Configure Replication

The active databases must be mounted and in a healthy state to configure replication.

To configure replication, do the following.

1. On **Exchange Management Console**, under **Organization Configuration**, select **Mailbox**.
2. The Mailbox objects display showing the various configuration tabs.
3. Select the **Database Management** tab.
4. Select **MBX1**, **DB1**. Right click and select **Add Mailbox Database Copy**.
5. The **Add Mailbox Database Copy** wizard displays.
6. Click **Browse** and select **MBX2**.
7. Click **OK** to confirm.
8. Click **Add**.

The replication process starts. The active DB1 on MBX1 will replicate to MBX2. Once completed successfully, The Exchange Management Console should show a mounted DB1 (active) and a healthy DB1 (passive).

Repeat these procedures for configuring the rest of the database copies. Use Table 7 as a guide for the database copies layout.

Depending on your network bandwidth and a database size, replication can take from minutes to hours.

Note—Before a passive database can be in a healthy state, the **Copy Queue Length** and **Replay Queue Length** need to be 0 (zero).

For More Information

Hitachi Data Systems Global Services offers experienced storage consultants, proven methodologies and a comprehensive services portfolio to assist you in implementing Hitachi products and solutions in your environment. For more information, see the Hitachi Data Systems Global Services website.

Live and recorded product demonstrations are available for many Hitachi products. To schedule a live demonstration, contact a sales representative. To view a recorded demonstration, see the Hitachi Data Systems Corporate Resources website. Click the **Product Demos** tab for a list of available recorded demonstrations.

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Hitachi Data Systems Corporation

Corporate Headquarters
750 Central Expressway, Santa Clara, California 95050-2627 USA
www.HDS.com

Regional Contact Information
Americas: +1 408 970 1000 or info@HDS.com
Europe, Middle East and Africa: +44 (0) 1753 618000 or info.emea@HDS.com
Asia-Pacific: +852 3189 7900 or hds.marketing.apac@HDS.com

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